

Using GIS to Analyze Historical Flood Fatality Patterns

WV GeoCon 2026

West Virginia GIS Technical Center

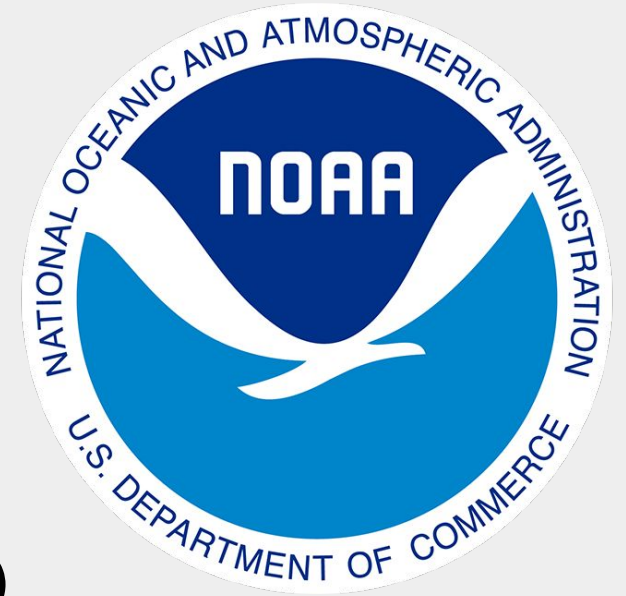
Why use GIS?

- Historical flood fatality records are spatially incomplete
- Fatality locations are dispersed across archival sources
- GIS enables spatial reconstruction and pattern analysis
- Supports flood mitigation and hazard planning



Data Sources

- Historical newspapers
- WV Culture Center
- FEMA
- NOAA rainfall / flood records
- USGS
- NID (National Inventory of Dams)



FEMA

Historical Records

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graph TD; A[Historical Records] --> B[Data Extraction & Validation]; B --> C[Geocoding Historical Fatalities]; C --> D[GIS Database Development]; D --> E[Spatial Analysis]; E --> F[Geospatial Products];
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Data Extraction & Validation

Geocoding Historical Fatalities

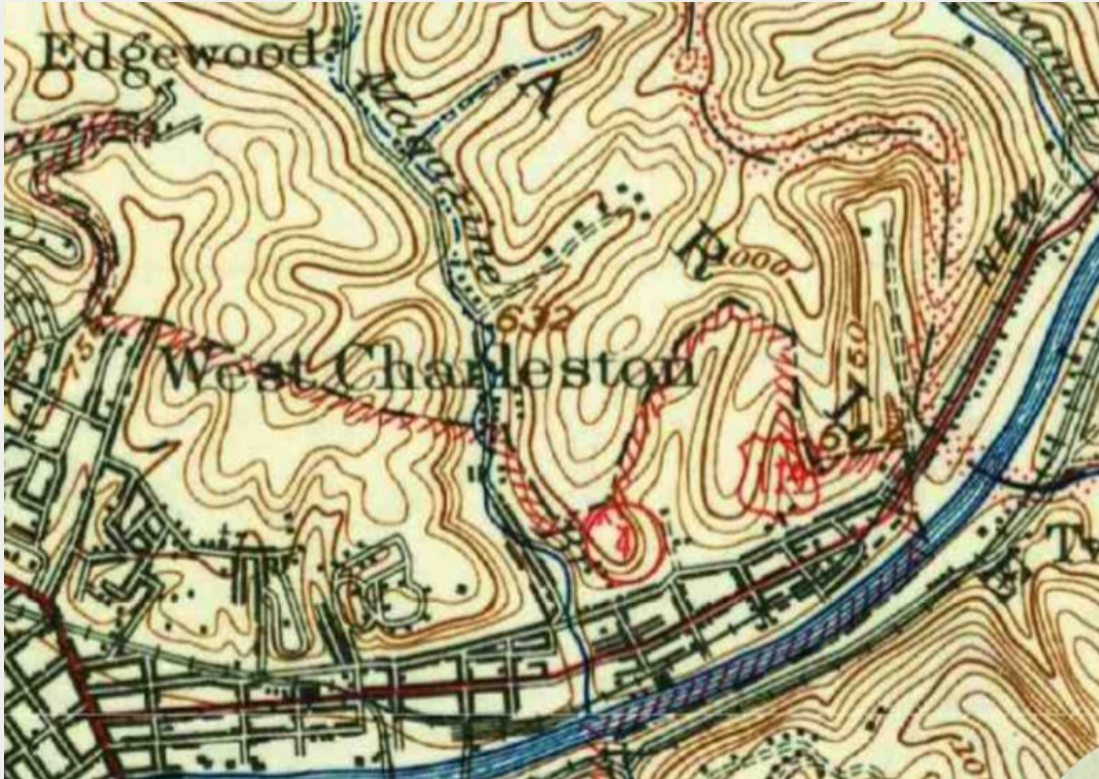
GIS Database Development

Spatial Analysis

Geospatial Products

Last Name	First Name	Gender	Age	County	Location	Community	Watershed	Flood Source	Cause of Death
[REDACTED]	[REDACTED]	Female	27	Kanawha	Rutledge Rd	Twomile	Elk	Elk Two-Mile Creek	House Swept Away - Drowned
[REDACTED]	[REDACTED]	Female	3	Kanawha	Rutledge Rd	Twomile	Elk	Elk Two-Mile Creek	House Swept Away - Drowned
[REDACTED]	[REDACTED]	Male	60	Kanawha	Rutledge Rd	Twomile	Elk	Elk Two-Mile Creek	House Swept Away - Drowned
[REDACTED]	[REDACTED]	Female	50	Kanawha	Rutledge Rd	Twomile	Elk	Elk Two-Mile Creek	House Swept Away - Drowned
[REDACTED]	[REDACTED]	Female	3	Kanawha	164 Wertz Ave	Riverview	Upper Kanawha	NONE	In-Water Drowning
[REDACTED]	[REDACTED]	Female	6	Kanawha	164 Wertz Ave	Riverview	Upper Kanawha	NONE	In-Water Drowning
[REDACTED]	[REDACTED]	Female	42	Kanawha	63 B Garrison Ave	Charleston	Elk	Magazine Branch	House Swept Away - Drowned
[REDACTED]	[REDACTED]	Female	8	Kanawha	63 B Garrison Ave	Charleston	Elk	Magazine Branch	House Swept Away - Drowned
[REDACTED]	[REDACTED]	Male	38	Kanawha	Barton St. and Washington St.	Charleston	Lower Kanawha	NONE	Vehicular - Drowning
[REDACTED]	[REDACTED]	Male	66	Kanawha	145 Garrison Ave	Charleston	Elk	Magazine Branch	Mudslide - Drowning
[REDACTED]	[REDACTED]	Male	85	Kanawha	145 Garrison Ave	Charleston	Elk	Magazine Branch	Mudslide - Drowning
[REDACTED]	[REDACTED]	Male	7	Kanawha	275 Garrison Ave	Charleston	Elk	Magazine Branch	
[REDACTED]	[REDACTED]	Female	48	Kanawha	275 Garrison Ave	Charleston	Elk	Magazine Branch	
[REDACTED]	[REDACTED]	Female	8	Kanawha	65 Garrison Ave	Charleston	Elk	Magazine Branch	Drowning
[REDACTED]	[REDACTED]	Female	49	Kanawha	65 Garrison Ave	Charleston	Elk	Magazine Branch	Drowning
[REDACTED]	[REDACTED]	Male	6	Kanawha	Rutledge Rd	Twomile	Elk	Elk Two-Mile Creek	Drowning
[REDACTED]	[REDACTED]	Male	4	Kanawha	Rutledge Rd	Twomile	Elk	Elk Two-Mile Creek	Drowning
[REDACTED]	[REDACTED]	Female	5	Kanawha	Rutledge Rd	Twomile	Elk	Elk Two-Mile Creek	Drowning
[REDACTED]	[REDACTED]	Male	11 mo.	Kanawha	Rutledge Rd	Twomile	Elk	Elk Two-Mile Creek	Drowning
[REDACTED]	[REDACTED]	Male	60	Kanawha	Keystone Dr	Twomile	Elk	Elk Two-Mile Creek	
[REDACTED]	[REDACTED]	Female	62	Kanawha	Keystone Dr	Twomile	Elk	Elk Two-Mile Creek	
[REDACTED]	[REDACTED]	Female	10	Kanawha	215 Garrison Ave	Charleston	Elk	Magazine Branch	Drowning

Geocoding Historical Fatalities

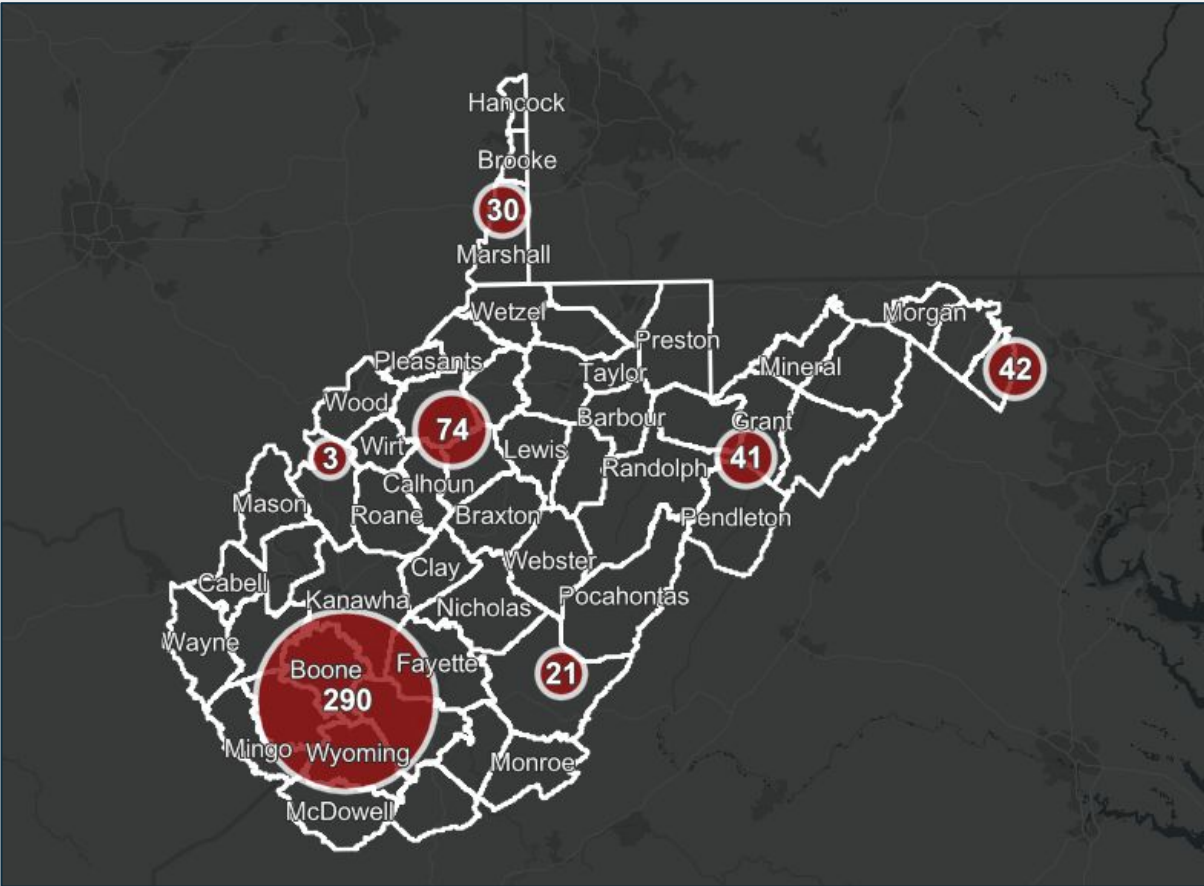


- Locations reconstructed from historical newspaper descriptions
- Historical place names and roadway changes complicated geolocation
- GIS aligned archival references with modern spatial datasets

Spatial Analysis

- Overlay with FEMA flood zones
- Stream / roadway analysis
- Watershed integration
- Comparison with post-flood mitigation structure locations





Flood Fatality X

Field: Add Calculate Selection: Select By Attributes Zoom To Switch Clear Delete Copy

#	Year *	Month	Gender	Age	County	Community	Flood Source	Mitigation	FEMA Flood Zone	Flood Type
1	2016	June	Male	60	Greenbrier	Caldwell	Howard Creek	Stream Gauge	Zone AE	Summer Thundersto
2	2016	June	Male	16	Greenbrier	White Sulphur Springs	Howard Creek	Stream Gauge	Zone AE(Floodway)	Summer Thundersto
3	2016	June	Female	33	Greenbrier	White Sulphur Springs	Howard Creek	Stream Gauge	Zone AE(Floodway)	Summer Thundersto
4	2016	June	Male	68	Greenbrier	White Sulphur Springs	Howard Creek	Stream Gauge	Zone AE(Floodway)	Summer Thundersto
5	2016	June	Female	54	Greenbrier	White Sulphur Springs	Howard Creek	Stream Gauge	Zone AE(Floodway)	Summer Thundersto
6	2016	June	Female	14	Greenbrier	White Sulphur Springs	Howard Creek	Stream Gauge	Zone AE(Floodway)	Summer Thundersto
7	1916	August	Male	Unknown	Raleigh	Whitesville	Toms Branch	NONE	Zone A	Summer Thundersto
8	2016	June	Male	82	Greenbrier	Rainelle	Sewell Creek	Stream Gauge	Shaded X	Summer Thundersto
9	2016	June	Female	60	Greenbrier	Neola	Anthony Creek	Stream Gauge	Zone A	Summer Thundersto
10	2016	June	Female	81	Greenbrier	Neola	Anthony Creek	Stream Gauge	Zone A	Summer Thundersto
11	2016	June	Female	80	Greenbrier	Rupert	Big Clear Creek	NONE	Zone A	Summer Thundersto
12	2016	June	Female	67	Greenbrier	Rupert	Big Clear Creek	NONE	Zone A	Summer Thundersto
13	2016	June	Male	70	Greenbrier	Rupert	Big Clear Creek	NONE	Zone A	Summer Thundersto
14	1916	August	Male	Unknown	Boone	Ferndale (Garrison)	Seng Creek	NONE	Zone A	Summer Thundersto
15	1916	August	Female	Unknown	Boone	Ferndale (Garrison)	Seng Creek	NONE	Advisory A	Summer Thundersto
16	1916	August	Male	Unknown	Boone	Ferndale (Garrison)	Seng Creek	NONE	Advisory A	Summer Thundersto
17	1916	August	Female	Unknown	Boone	Ferndale (Garrison)	Seng Creek	NONE	Advisory A	Summer Thundersto
18	1916	August	Unknown	Unknown	Boone	Ferndale (Garrison)	Seng Creek	NONE	Advisory A	Summer Thundersto
19	1916	August	Unknown	Unknown	Boone	Ferndale (Garrison)	Seng Creek	NONE	Advisory A	Summer Thundersto
20	1916	August	Male	Unknown	Boone	Ferndale (Garrison)	Seng Creek	NONE	Advisory A	Summer Thundersto
21	1916	August	Unknown	Unknown	Boone	Ferndale (Garrison)	Seng Creek	NONE	Advisory A	Summer Thundersto
22	1916	August	Unknown	Unknown	Boone	Ferndale (Garrison)	Seng Creek	NONE	Advisory A	Summer Thundersto
23	1916	August	Unknown	Unknown	Boone	Ferndale (Garrison)	Seng Creek	NONE	Advisory A	Summer Thundersto
24	1916	August	Unknown	Unknown	Boone	Ferndale (Garrison)	Seng Creek	NONE	Advisory A	Summer Thundersto
25	1916	August	Female	Unknown	Boone	Ferndale (Garrison)	Seng Creek	NONE	Advisory A	Summer Thundersto

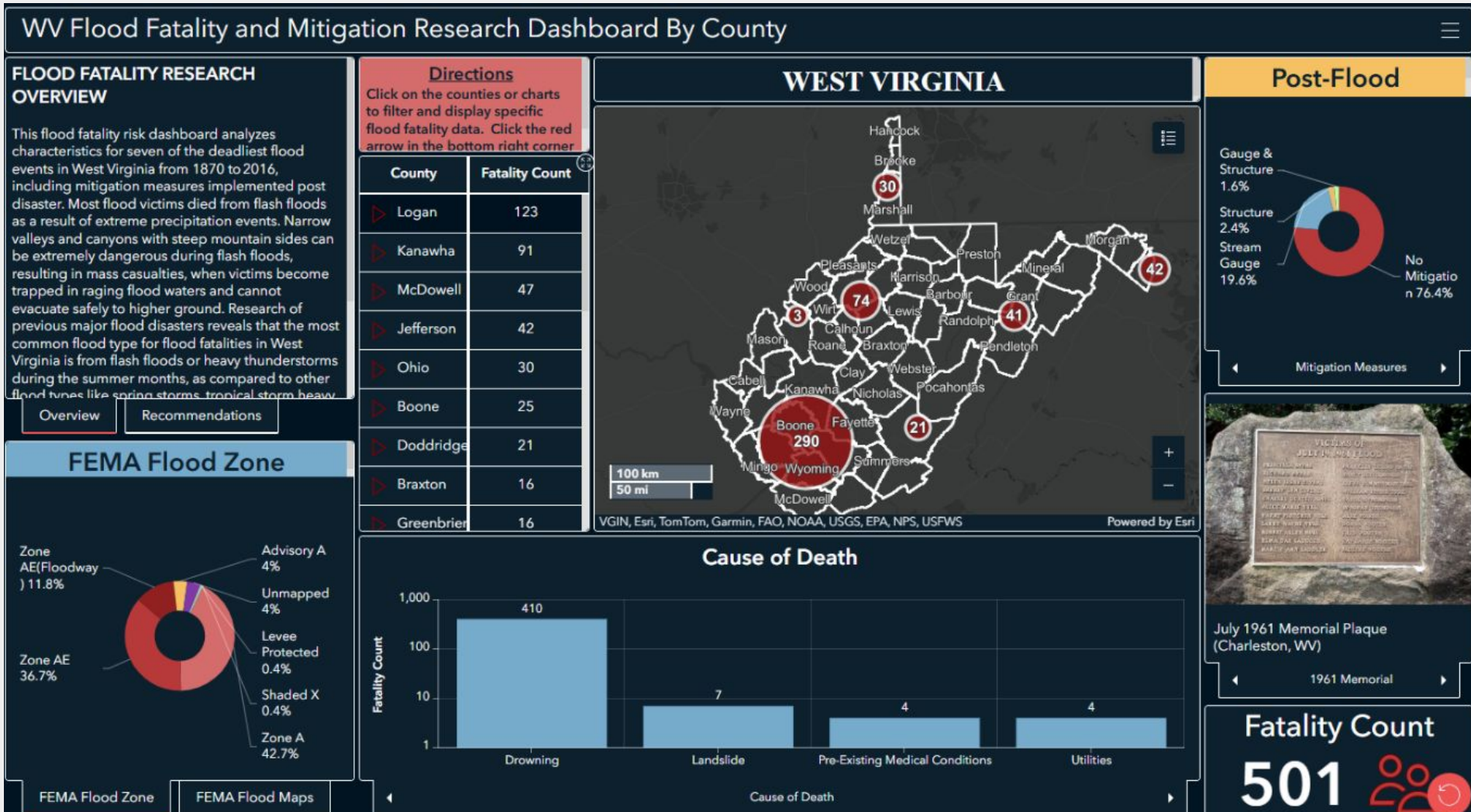
Spatial Findings

- Fatalities clustered in narrow valleys
- Several fatalities occurred outside modern FEMA flood zones
- Many deaths occurred near stream crossings and transportation corridors
- Majority of fatalities were part of mass casualty events




Geospatial Deliverables

Dashboards



Story Map

The 12 Deadliest Flood Events in West Virginia History



Overall Findings Great Virginia Flood of 1870 Ohio River Floods of 1888 The Great Flood of 1889 Goodwill Flood of 1901 Cabin Creek Flood of 1916 →

Flooding has shaped the history of West Virginia, leaving behind stories of devastation, loss, and resilience. Across the state, floods have claimed hundreds of lives, often striking with little warning and completely overwhelming communities. This research documents 488 flood fatalities from 12 major disasters, mapping where they occurred, who was most affected, and what factors contributed to the loss of life. By examining these tragedies, we can better understand the patterns of flood-related deaths, the effectiveness of mitigation efforts, and the ongoing risks faced by West Virginians.

Limitations

- Historical newspaper accounts often contained vague or inconsistent location descriptions
- Geocoding accuracy was limited by changing place names, road networks, and landscape features

1901	Upper						
Jett. J. E.	1			1	9/10	Baltimore	Madison St. 56
Kutscher S.M.	1			1	10/5	Indian Run	Syphard St. 55
Kirby Ezra P.	1			1	4/21	Mt. Clare	Bonwash St. 4
Kinney William	1			1	12/11	Clarksburg	Bon Wash
Kinney Clifford M.	1			1		Salom	Huffathens 9
Lawson Alb.	1			1	10/24	Craigmore	Consumption 51
Lawson Henry	1			1	1/2	Richard	Heart failure 89
McWhorter Walter	1			1	9/6	Jane Sew	accident 77
Madiker E. A.	1			1	11/1	W. Milford	Syphard St. 59
Murphy Charles	1			1	9/20	Just Hill	Spasms
McAfee Sam	1			1	1/19	Clarksburg	Pneumonia 4
Marant John	1			1	8/9	"	Madison Street 45
Mills James	1			1	7/1	"	" 52
Mayers Child	1			1	6/27	Heavy Town	Whooping Cough 3
Mad. Daniel	1			1	3/1	Sards.	" 1
Montgomery Samuel	1			1	7/20	Bristol	Cholera 2
Malone William	1			1	7/5	A. Infirmary	Heart Sick 44
Miley Mary B.	1			1	10/20	Last Creek	Syphard St. 11
Morris John M.	1			1	7/6	Sennels	Bright's Disease 57
Michals	1			1	Mich.	Belfrage Cr.	"
Norman Isabella	1			1	12/2	Johnstown	Apoplexy 76
Nuttall Geo. W.	1			1	8/19	Jane Sew.	Consumption 57
Nuttall Annie	1			1	9/29	"	" "
Nuttall Emma	1			1	12/10	Salom	" 11
Ogden Harry	1			1	12/16	Belopolis O.	"

Future GIS Applications

- Predictive modeling of future flood fatality risk
- Expansion into real-time hazard and evacuation planning
- Machine learning approaches for vulnerability predictions
- Integration of LiDAR and high-resolution terrain analysis

Thank you!

Whitney Belcher – whitney.belcher@mail.wvu.edu
wvgis.wvu.edu

